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A. S. A. E. MEETING

WILL BE HELD IN CHICAGO, ILLINOIS

DECEMBER 28-29-30, 1920

SOUTHERN SECTION MEETING AT MEMPHIS, TENNESSEE

The Southern Section of the American Society of Agricultural Engineers met in a two days session at Memphis, Tennessee, August 30 and 31. The meeting the first day was held in the Chamber of Commerce rooms and the second day was spent on the Mississippi Experimental Farm near Holly Springs, Mississippi.

Over half of the members of the Southern Section and a number of interested non-members attended these meetings.

The following is a list of the old and new officers:

Officers, 1920

President—E. R. Gross, Mississippi Agricultural College, Agricultural College, Mississippi.

Vice president—N. S. Nichols, Auburn, Alabama.

Secretary-treasurer—J. B. Kelley, University of Kentucky, Lexington, Kentucky.

Officers, 1921

President—Stanley F. Morse, consulting agricultural engineer, New Orleans, Louisiana.

Vice president—Jas. Arentson, Reeks & Lafarge, Foreign & Domestic Products Co., Memphis, Tennessee.

Secretary-treasurer—Chas. E. Seitz, extension specialist, Blacksburg, Virginia.

The committee on local arrangements consisted of James Arentson, Reeks & Lafarge, Foreign and Domestic Products Company, Memphis, Tennessee; E. R. Lloyd, director, Bureau of Farm Development, Memphis, Tennessee.

The following program had been arranged:

Monday August 30 — Morning Session

9:00 — Registration and social meeting.

9:15 — Call to order, James B. Arentson, chairman of committee on local arrangements.

9:30 — President's annual address, E. R. Gross, Mississippi Agricultural and Mechanical College, Agricultural College, Mississippi.

10:00 — "How to Improve Sanitary Conditions in the South," H. R. Herndon, Portland Cement Association, Dallas, Texas.

11:00 — "Plantation Management," Stanley F. Morse. consulting agricultural engineer, New Orleans, Louisiana.

Afternoon Session

2:00 — "Terracing as a Soil Saver," H. B. Bliss, College of Agriculture, Knoxville, Tennessee.

3:00 — "Methods of Conducting Drainage Extension Work in the South," S. H. McCrory, engineer in charge of rural engineering, Washington, D. C.

4:00 — "Dynamiting," P. H. Williams, Memphis, Tennessee.

Evening Session

7:30 — "Farm Machinery Situation in the South," F. R. Jones, John Deere Plow Co., Knoxville, Tennessee.

8:30 — "The National Retail Hardware Association and the College Agricultural Engineers," Herbert Sheets, secretary and treasurer the Retail Hardware Association, Argos, Indiana.

9:30 — "Agricultural Engineering Experimental Work," F. D. Cotrell, Mississippi Agricultural and Mechanical College, Agricultural College, Mississippi.

Tuesday, August 31 — Morning Session

9:00 — Agricultural Engineering Instruction," Daniel Scoates, Agricultural and Mechanical College, College Station, Texas.

9:45 — "Instructive Work in Agricultural Engineering," E. R. Gross, Mississippi Agricultural and Mechanical College, Agricultural College, Mississippi.

10:45 — Business session.

Afternoon Session

Special trips to points of interest in and about Memphis.

The articles were not all given in the order as shown on the program due to the fact the second day was spent at Holly Springs, Mississippi, and the articles upon soil erosion were left until that time.

The Engineers Club of Memphis gave the members of the convention a banquet Monday noon. A large number of the engineers of Memphis were present at this banquet and after the last course had been served all the chairs were turned toward the president of the Engineering Club who gave an interesting talk and later introduced other prominent engineers.

The second day was a most interesting one at Holly Springs. Mr. C. T. Ames who has been in charge of the farm there for a number of years showed the delegates over the farm. Because Mr. Ames had taken this badly eroded land and reclaimed it again by terracing he was able to give the delegates the very best along the line of reclaiming land by terracing. Soil erosion is one of the big problems in parts of the south at the present time.

It was voted to have the next meeting of the Southern Section in February of next year. They are planning upon meeting with the Southern Agricultural Educational Society at Lexington, Kentucky.

Agricultural Engineering

By F. N. G. Kranich, President A. S. A. E.[1]

Agriculture as a whole, may be divided into several periods. The first one of these would be the period of hand work, the second we may call a period of horse or animal work, and the third, the period of power farming, which is the one we are now interested in.

The growth and development of our country is because of its agriculture and has been in proportion to the development of the implements that are used in agriculture. This, therefore, means agricultural engineering.

We are often told, and often read, that engineering has played no part in agriculture. Some even have said that there is no engineering in agriculture and never has been.

The fact of the matter is, however, that one American farmer can grow as much as forty Chinese farmers will do, which leads us to think considerably before subscribing to such a statement.

The fact that the cities are growing and industry developing, whereas the rural population is decreasing and farm labor becoming scarce, proves conclusively that agricultural engineering and the development of implements has played some important part in this program.

It might not be out of order to even say that agricultural engineering is absolutely necessary because it deals with agriculture which is basic and fundamental.

It might also be said that no branch of engineering whatever, is any more necessary than is this branch or agricultural engineering. It deals with the necessities. It deals with tractors, with plows, harrows, mowers, binders, threshers, silo fillers, shellers and all farm machinery.

It deals with drainage and irrigation.

It deals with farm building construction — ventilation and sanitation.

It is a field that while not as attractive to many as some of the other engineering branches, it will, before long, receive the recognition that it deserves because of the industry it serves.

In bringing before the public, therefore, this journal, it is with a feeling that it will hasten the day of greater appreciation of the value of agricultural engineering as a science and an art.

The American Society of Agricultural Engineers is rapidly bringing out these points and getting the recognition that must necessarily come to any society that works with things so fundamental as agriculture, and the production of food.

The men who have contributed to the development of machinery for the farm, who have contributed to the science relating to agriculture, are the men whose names stand out prominently with those of members of any branch of engineering that might be named. These men have contributed their lot in bringing about the results that we have today, and in placing agriculture in America above that of any other country on the globe.

Furthermore, the work of agricultural engineering as an art and the problem of educating all concerned with what is going on, falls well within the scope of the American Society of Agricultural Engineers. Any farm work in an engineering way done with machinery of any sort whatever, comes well within the scope of the activity of this Society.

Not that it is the intention or the purpose in any way to claim glory for this Society, but it is the purpose and intention to bring about results that will be most satisfactory and far-reaching to the farmer, the dealer, the jobber, the manufacturer and, in fact, all concerned with agricultural equipment.

The purpose is to bring about results that will help everybody concerned rather than any individual, or claim glory for any particular society.

The data that will appear in each succeeding issue of this journal will be selected to meet the demands of those interested in this art. It will be based on research, on study, and on a sound basis for comparison for results of value to the great American institution of agriculture.

Convention Date Set

The annual convention of the American Society of Agricultural Engineers will be held in Chicago, Illinois, December 28-29-30, 1920. A strong program is being made up and all members are urged to attend this meeting. The usual number of technical papers will be read and some of the committees have some very interesting reports to make. In the line of diversions the committee on local arrangements will probably have some pleasing news in the near future. Watch for all news items concerning the convention. Some new plans are being worked out.

Monthly Luncheons

The Chicago members of the A. S. A. E. hold a luncheon in the men's grill room of the Marshall Field Annex the first Tuesday in each month. All members are asked to come in if they are in Chicago on this date.

[1] Manager tractor bearings division, Hyatt Roller Bearing Co., Chicago.

Standardization of Farm Equipment

By Raymond Olney[1]

The fundamental aim of all standardization is economy, and the benefit from the standardization of any product or process should accrue to all who are in any way affected by it. That is the measure of true standardization. In other words, the standardization of material, design, and production of a manufactured product, for example, should not only result in less effort or expense to the manufacturer from the standpoint of production, selling, or satisfaction to customers, but it should also reduce the selling price, cut down the expense of maintenance, or improve the service of the product in the hands of the purchaser. That is, to be true standardization it must benefit both manufacturer and purchaser in a number of ways.

Thus far standardization in the farm-equipment industry, that is, so far as any coöperative effort between manufacturers is concerned, has made but comparatively little progress. In fact it has not advanced sufficiently for its real benefits to be generally recognized. The most consistent effort and progress thus far made in the standardization of farm equipment took place during the war, when the curtailment and economy of production were essential to the most effective prosecution of the war. At that particular time the farm equipment manufacturers by coöperative effort under the stress of war conditions carried the process of eliminating superfluous styles and sizes of implements and machines to an extent that previously would have been considered impossible. It was this action upon the part of the manufacturers which probably opened the way more than anything else to a subsequent arrangement with the American Society of Agricultural Engineers to take up the matter of standardization of farm equipment in earnest. The wartime eliminations were a good example of what could be done in the way of standardization in the farm-equipment industry, and moreover they furnished tangible evidence of the results that might be expected by coöperative effort.

There is no denying the fact that the time has come when the farm-equipment industry should be giving more attention to standardization work. Other industries have for a number of years devoted a great deal of attention to standardization, and the economic benefits derived therefrom are seen every day and on every hand in greatly simplified living and working conditions. The farm-equipment industry is by no means the last to take up standardization work, and neither should it be. The demand for it is real.

It is probably true that no one connected with the agricultural implement industry would deny the statement that standardization, at least to some extent, was needed and would benefit both manufacturers and purchasers. At the present time, for example, the application of mechanical power to the operation of farm equipment has already been the means of making some radical changes in the industry. Furthermore, these changes constitute merely a forerunner of what is going to take place. As an example, the representative of a certain manufacturer of farm equipment recently made the statement that, if high speed tractor operation in connection with farm implements continues to become more general, it would mean the redesigning of their entire line of implements to meet the requirements of high-speed operation, for the reason that they were originally designed for the use of horses and for speeds usually maintained by horses. The development and improvement of farm machinery is taking place at a much more rapid rate since the introduction of the tractor, and it would seem that along with these developments it would be highly desirable that standardization should be kept in mind and worked out wherever standardization can be accomplished to advantage. One of the dangers of standardization, however, is in attempting to carry it too far; obviously it would be just as harmful to do too much standardizing as none at all.

Considering the need of standardization of farm equipment from the standpoint of the farmer, it must be recognized that he is being compelled to produce farm products at less cost than in former years in order that he may be assured a reasonable profit on his labor. This is a condition which has prevailed in manufacturing industries for some time and which would naturally sooner or later become true in the farming industry. Production costs on the farm have risen materially in the past two years and the prices which the farmer receives for his products are, or have been up to this time, indeed, to a large extent beyond his control. It seems reasonable, therefore, to believe that the farmer like every good business man must henceforth, more than in the past, give greater attention to lowering production costs, for certainly so far as the farmer is concerned his time and thought can be spent more profitably in figuring out ways and means of reducing expense rather than in speculation as to the market prices he may or may not receive for his produce. And

[1] Editor *Power Farmer and Power Farming Dealer,* St. Joseph Michigan. Chairman standards committee, American Society of Agricultural Engineers.

in addition he is being compelled, more and more, to standardize his farming operations.

The standardization of farm equipment will operate to the farmer's benefit to the extent that it reduces the cost of producing it at the factory and any possible effect such decrease in cost of production may have on lowering the selling price and also to the extent to which it will simplify its maintenance, both from the standpoint of securing needed repairs promptly and otherwise improving the service of the equipment.

What was undoubtedly the biggest step ever taken in arousing interest in and giving impetus to standardization work in the farm-equipment industry was when officially appointed committees from the American Society of Agricultural Engineers and the National Implement and Vehicle Association met in joint conference in November, 1919, to organize what has since become known as the "Agricultural Equipment Standards Committee." The purpose of this organization was to provide the means for agricultural engineers, farm-equipment manufacturers, and other interests to coöperate in the matter of formulating and adopting standards for the industry. Membership in this organization will be composed of representatives from the American Society of Agricultural Engineers, the National Implement and Vehicle Association, and other organizations substantially interested in farm equipment standardization work. Already a considerable amount of work has been started. The purpose of the agricultural equipment standards committee is to promote and adopt standards but not to formulate them. The task of formulating or recommending a standard is delegated to one or more organizations having representation on the agricultural equipment standards committee or which is coöperating with that committee.

During the past year a great deal of standardization work has been started in the farm-equipment industry which is accounted for largely by this means of getting those interested together on a common ground of understanding and coöperation.

Perhaps the most important step taken in standardization work by the newly created agricultural equipment standard committee is the adoption of standard belt speeds. Five different belt speeds — 1500, 2600, 3000, 3250, and 3500 feet per minute — have been adopted by the American Society of Agricultural Engineers and the National Implement and Vehicle ssociation as standard for the industry. While it is true that conditions due to having no standard belt speed at all have not been appreciably improved by the adoption of these five standard belt speeds, still it is generally felt that their adoption is a big step in the right direction. As a matter of fact, however, there is no excuse for more than possibly two and certainly not more than three speeds. It is to be hoped, however, that the industry will soon see the advisibility of still further reducing the number of belt speeds in the early future, for only by so doing can the real benefits of standardized belt speed be obtained.

It is true that standardization work must necessarily progress slowly. The adoption of standards by manufacturers frequently means a great deal of inconvenience and considerable expense, and there is usually apprehension on the part of some manufacturers that the individuality of their machines may be jeopardized by adopting standards, and consequently handicap them in the matter of sales. It should be said in all fairness to manufacturers, however, that this view is taken only by the short-sighted manufacturer who has not taken the trouble to analyze the benefits that he would derive from adopting a certain standard.

For several years a great many attempts have been made to arrive at a standard method for rating the brake and drawbar horsepower capacity of internal-combustion tractors. At the present time, the standards committee of the American Society of Agricultural Engineers is working on a proposed standard testing code, the object being to work out something that will serve the same purpose in the testing of tractors as the standard boiler-testing code for testing steam boilers, which was worked out by the American Society of Mechanical Engineers and which has proved so successful and satisfactory. A particular advantage of the standard testing code is that the testing can be done at the factory of the manufacturer and the expense connected with shipping machines to some central point for testing will be eliminated. In this proposed method it is anticipated that the engineer who tests a certain make of tractors will select several machines from stock for testing according to the standard code, the average of the results obtained being used to determine the rating of each model of tractor.

The standards committee of American Society of Agricultural Engineers is also working very closely with the barn-equipment department and the ensilage machinery department of the National Implement and Vehicle Association. Recently a joint meeting of the agricultural engineers with each of the barn equipment and ensilage machinery manufacturers was held to formulate recommendations for standards in the respective lines. In the case of barn-equipment standards a standard manger form and a standard rating for sizes and capacities of litter carriers was proposed. In the case of ensilage machinery the committees formulated recommendations for a standard method of rating the capacities and power requirements of ensilage cutters. Recommendations in each case have been submitted for the consideration of the manufacturers of the two departments of the National Implement and Vehicle Association.

In addition to this a great amount of standardization is needed and in contemplation in connection with standard specifications for steel for the farm-equipment industry, for plow belts, disk harrow blades, rolling coulters, and

(Continued on page 18)

Agricultural Engineering

The Journal of the American Society of Agricultural Engineers

By J. B Davidson [1]

The publication of the initial number of Agricultural Engineering, the journal of the American Society of Agricultural Engineers, heralds a new era in the history of the organization. A request has been made of the writer to trace the development of the Society up to this time.

Charter Members American Society of Agricultural Engineers
Front Row (left to right) — J. W. Criswell, Mr. Parker, F. R. Crane, J. B. Davidson, P. S. Rose, H. M. Bainer.
Second Row — W. M. Nye, C. A. Ocock, Howard W. Riley, John Evans, E. A. White, M. L. King.
Standing, Rear — E. W. Hamilton, Mr. White.
Not present in picture but attending organization meeting — B. B. Clark, L. W. Chase, John Wynn.

Although it has long been recognized that agricultural production is largely mechanical in character and to which engineering practice and methods are applicable, agricultural engineering as a science has been slow of development, and agricultural engineering as a profession still more backward. The principal cause for the retarded development lies in the fact that agricultural operations are carried on in small units and thus not organized in a way to command the interest of a highly trained specialist in engineering. The exceptions to the general course of development were first found in drainage, irrigation, and highway engineering, which could only be carried out through organization in large units and the engineering connected with the production of agricultural equipment of all kinds.

Furthermore, educational development has been no small factor in developing agricultural engineering as a science and a profession. The earliest curricula of the

[1] Head Agricultural Engineering Department, Iowa State College, Ames, Iowa. Member A. S. A. E.

agricultural colleges in the United States included subjects in agricultural engineering, which is abundant evidence of the appreciation of engineering practice in the training of agricultural students. In the teaching of these subjects specially trained men were required and texts needed.

It is in the development and manufacture of agricultural equipment that unusual progress of an engineering nature has been made, for we have as a people surpassed all others in this respect.

As a whole progress has been slow, and even with the development of agricultural machinery and equipment little record of the work accomplished has been made outside of the machines themselves. With the exceptions, drainage, irrigation, and highway engineering, little literature has been developed.

An uncultivated field offers the larger opportunity for development and agricultural engineering is eminently such a field. There never was the time in the world's history when there was such a demand for methods and equipment which will make the agricultural worker more effective, nor such a need for the extension of engineering practice to farm life for the purpose of making rural life comparable in comforts and convenience with life in the cities.

The scene set for the birth of the American Society of Agricultural Engineers was a gathering of instructors at the University of Wisconsin in December, 1907. The inspiration for the organization of a Society of Engineers came from the two honorary members of the Society, Messrs. B. B. Clarke and A. O. Fox. No doubt some form of a permanent organization would have been framed, but few among those in attendance would have had the courage to announce the organization of a national engineers' society if they had not been spurred on by the enthusiasm of these two men.

From the small beginning of seventeen charter members the Society made but slow growth for several years. During the past two years the increase in membership has been rapid, the membership being doubled in the last nine months. The time is at hand when advantage should be taken of this marked interest in the Society. It is not sufficient that the organization meet once a year for the sake of reading papers and discussing the same. It should be an institution at work every day of the year, rendering continuous service to the membership. The Journal will go a long way toward accomplishing this end.

National Implement and Vehicle Association Convention

Available information concerning the N. I. V. A. convention at Atlantic City, October 20-21-22 indicates that many manufacturers expect to attend. From all indications the companies in the middle west will be as well represented as those in the east. The men from the middle west states will have a special to take them to the convention city. This special leaves Chicago at 5:30 P.M. on October 18. Manufacturers arriving from Cleveland or St. Louis may make connections with this special at Pittsburgh.

Much care has been exercised in the selection of men to address this convention. F. R. Todd of Deere & Co. is to deliver an address upon "The Farm Operating Equipment Industry and Its Relation to Agriculture." W. H. Barr, president of the Inter-Racial Council, or some other representative of that body, will give an address upon the "Labor Situation." "Obligations of Bankers in Relation to the Financing of Agriculture" is to be the subject of an address to be delivered by an official of the American Bankers' Association. J. B. Davidson, secretary-treasurer of the Society of Agricultural Engineers, will deliver an address upon "Standardization." Geo. W. Collins, president of the National Federation of Implement and Vehicle Dealers' Associations; John Fletcher, vice president of the Fort Dearborn National Bank of Chicago, and J. R. Howard, president of the American Farm Bureau, will also deliver addresses.

Notice

The proceedings of the last ten conventions of the American Society of Agricultural Engineers can now be purchased at the following prices:

Per 11 volumes (ten conventions) for A. S. A. E. members $4.50
Per 11 volumes (ten conventions) for non-members $9.00
Per single volume (one convention) for A. S. A. E. members $0.50
Per single volume (one convention) for non-members $1.00

The publications include articles by well known men upon drainage, irrigation, sanitation, farm structures, farm machinery, tractors, stationary engines, along with committee reports upon farm building equipment, research, standards, drainage, irrigation, sanitation, farm power, farm structures, farm building ventilation, roads, and education.

The supply is limited.

For orders or information, write Frank P. Hanson, Assistant Secretary A. S. A. E., Ames, Iowa.

Conventions

October 12-14. The National Federation of Implement and Vehicle Dealers' Associations will hold their twenty-first annual convention in Chicago, Illinois.

October 20-22. National Implement and Vehicle Association annual convention at Atlantic City, New Jersey.

December 28-29-30. Annual convention of American Society of Agricultural Engineers at Chicago, Illinois.

February 7-12, 1921. National Tractor Show at Columbus, Ohio.

Hardening Soft Center Steel Plow Shapes

By G. W. Rynders[1]

The plow bottom is the basic part of a plow, and, to do efficient work, its parts, the share and moldboard, must be hardened. This gives the very desirable and important quality of a polishing and wear resisting surface.

There are three kinds of steel generally used for shapes: open hearth, crucible, and soft center, only the latter of which is hardened.

Soft center steel has a laminated structure of three separate layers of steel. The outer layers are of a high carbon or eutectoid steel, while the center layer is of a low carbon or hypo-eutectoid steel. In addition to these

layers, it is the common practice to weld an extra high carbon steel pad on the greatest wearing surface of the share and moldboard, thus giving a complicated structure of hypo-eutectoid, eutectoid and hyper-eutectoid steels.

Some knowledge of the critical points, and transformations, which take place during heat treatment is necessary for hardening the various steels. Fig. II is a thermal diagram of a piece of soft center steel, the abscissa represents time, and the ordinate, temperature. The plotting points were determined by clamping two pieces of soft center steel together, and drilling a hole in the outer layers, into which was inserted the tip of a pyrometer. The steel was heated in an electric furnace and temperature readings taken with a millivoltmeter.

There is a noticeable change in the heating curve at about 1350° Fahr., which designates the point of "Decalescence," or, that stage where the steel constituents, ferrite and pearlite, break up to form austenite and on slow cooling the reverse transformation takes place at 1285° Fahr., or, the point of recalescence, as shown on the cooling curve. These two points can be observed by the color changes while heating and cooling. They can also be approximately located by use of a magnet, as the steel has no magnetic attraction above these critical points. As the carbon content influences their location, a chemical analysis of the steel gives data sufficient to closely estimate the critical temperature range.

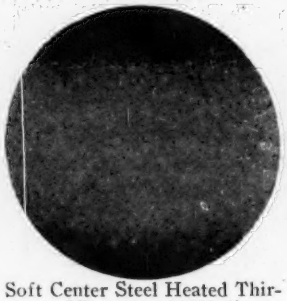
The decalescent and recalescent points are closely related and as the time of heating and cooling is increased the nearer will they approach each other in temperature range. The divergence in temperature is caused by the dilatory action or "Hysteresis" of the steel while cooling, a phenomena with which physicists are quite familiar. Without giving a detailed explanation it is sufficient to state that carbon steels have various critical points at different temperatures; being allotropic transformations of Alpha, Beta, and Gamma iron.

The hardening temperature ranges of the three steels are about as follows: Hypo-eutectoid (1600°-1650° Fahr.), eutectoid (1400°-1500° Fahr.), hyper-eutectoid (1350°-1400° Fahr.), allowance being made for 60° drop in temperature after removing from furnace.

The hypo-eutectoid layer is a low carbon steel, soft, tough and flexible; qualities which must be retained throughout the hardening process. It strengthens the outer layers to withstand the impace against stones in the plowing field. Its critical range is higher than the eutectoid, and, as no transformations take place below the critical temperatures, it is conclusive that the temperature for soft center steel is limited to 1600° Fahr.

The eutectoid or outer layers of steel must be given a maximum hardness, at the same time retaining a fine grain structure. As previously stated its temperature range is 1400°-1500° Fahr. Heating from 1500° to

Soft Center Steel Before Heating, Magnified 20 Diameters



Soft Center Steel Heated Thirty Minutes at 1900° F.

Soft Center Steel Heated One Hour at 2000° F.

Soft Center Steel Heated Two Hours at 2100° F.

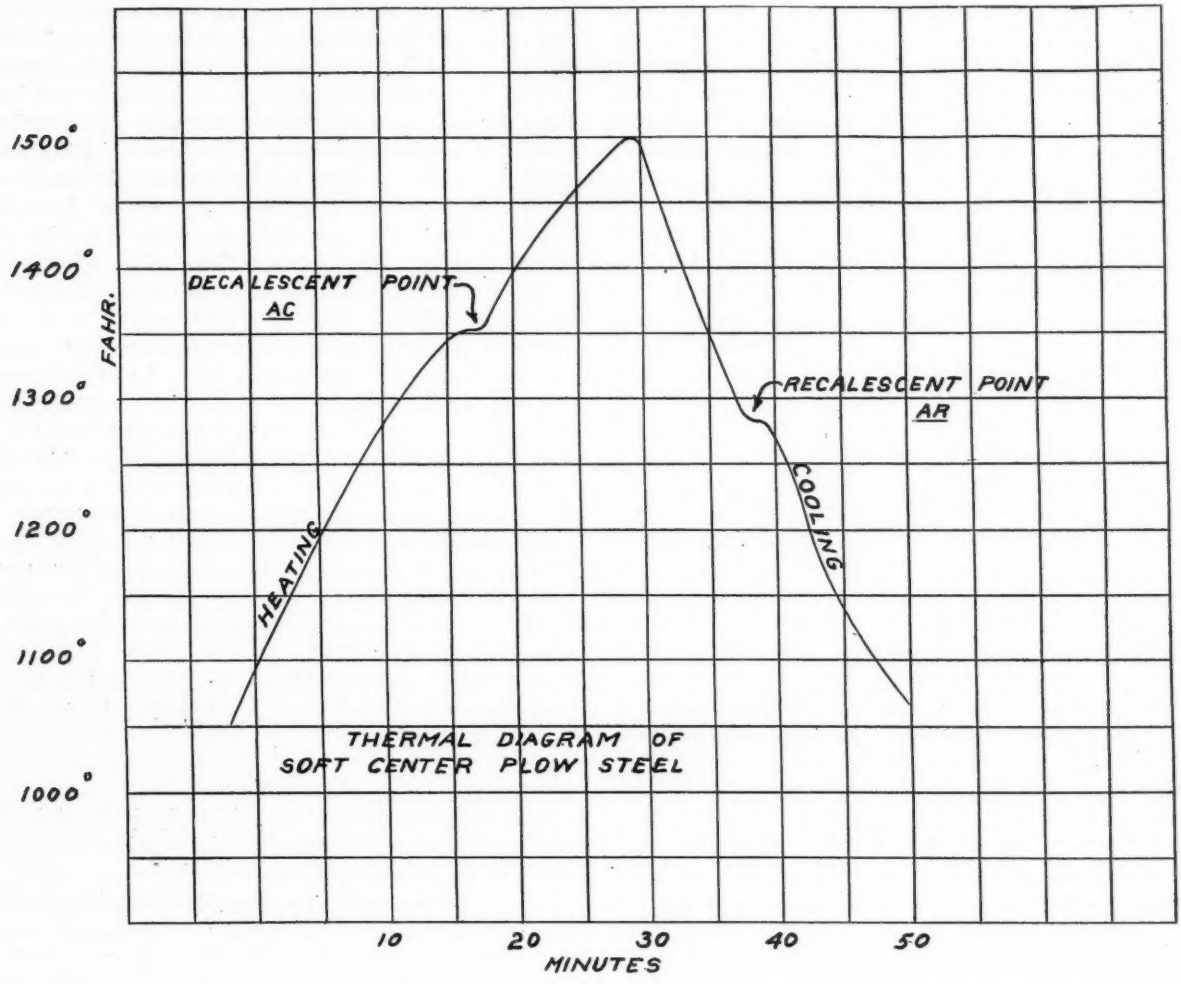
[1] Member A. S. A. E. Works engineer, Kankakee, Illinois.

1600° Fahr. would be of no advantage but rather a detriment inasmuch as grain growth would be promoted. Therefore, the maximum temperature for soft center steel is 1500°.

The hyper-eutectoid steel is of a higher carbon than eutectoid and a lower critical range. Considering that extra high carbon steel cannot be welded and must be quenched within its critical range to retain the finest grain structure, it is evident that the hyper-eutectoid steel is limited between .9 and 1% carbon which would permit of the temperature range 1400° to 1500° Fahr.

Heating the steel above its decalescent point forms austenite and upon quenching the constituents Martensite is retained, it being somewhat harder and more brittle than Austenite. Quenching the steel considerably above this point retains the coarse grain produced by this temperature, therefore, it is important to quench just slightly above the recalescent point. If quenched at lower temperatures the steel will not be as hard because the transitional stage would be from Martensite to troostite and finally sorbite.

The photomicrographs illustrate the time temperature effect on soft center steel having the following analysis: Outer layers. .88% carbon, the inner layer less than .20% carbon. Specimens were etched with 5% alcholic nitric and photographed at 20 diameters. The dark areas represent pearlite, the white areas ferrite and the white lines excess cementite. The grain growth and carbon migration which takes place at such high temperatures is quite noticeable.



Six to eight minutes are required to heat the plow shapes for satisfactory results. Rapid heating is to be avoided as it interferes with the reconstruction of the steel structure and tends to cause warping.

All plow shapes must be polished before hardening to remove the scale (iron oxide) from the surface of the steel.

(Continued on page 17)

Plantation Management from the Inside

By Stanley F. Morse [1]

The job of managing a plantation or farm is one of the most difficult to fill successfully in modern industrial life. A fully competent plantation manager must possess not only an unusual variety of personal qualifications, but also a very broad training and experience. Hence, it is not strange that owners of plantations should complain of the difficulty of securing first-class managers. The fact is that there are not sufficient men who are properly fitted for this work, one of the main reasons being that the low salaries commonly paid the plantation managers offer little inducement. However, the purpose of this paper is to discuss briefly some of the problems of plantation management as they have come under my observation.

Involved in plantation management are the following matters: (a) Organizing, (b) Supervising, (c) financing, (d) Buying, (e) Technical Methods, (f) Selling.

While management may be considered under the foregoing heads, the successful manager is the one who understands the relation of each one of these things to the other and can keep them properly coördinated and in balance. One of the most common troubles is the inability of the managers to coördinate their work. In the following discussion the work of the manager with a going enterprise rather than in the development of a new one is the point of view.

Organizing

No plantation can be managed successfully without a good organization. One of the most common causes of plantation troubles is one-man management. While I have had little experience with industrial enterprises outside of agriculture, it would appear that agricultural managers are more apt to be too autocratic. While the reason for this may be that the isolation of agricultural enterprises puts the manager in a position of unusual independence and power, and causes the employees to look up to and depend on him more than is desirable, nevertheless, it is true that the most successful managers are those who get the most team work out of their organizations.

Of course to function properly an organization must be divided into departments which will be few or many according to the size of the enterprise. The usual fundamental departments include: Office, crops, livestock, machinery, and engineering. The main point to observe, however, appears to be to so organize the departments that they shall not conflict with each other. The duties of employees and their relations to each other should be clearly defined and understood.

One of the hardest jobs is in securing competent employees. There are several factors involved besides simply offering a job, looking for the candidates and trying to pick the best ones. Most every farm manager has a reputation among the employees, either good or bad. He is known as a hard man, a square man, or a mean man, and nobody wants to work for mean managers and few for hard ones. In addition, such things as attractive houses, reasonable hours of work, gardens and other perquisites, bonuses, and the like have a great influence on prospective employees and the permanency of those already employed. In several instances the operation of the plantation store for the convenience of the employees, selling a little below the average retail price has been a material attraction.

The systematic manager usually keeps a record of his individual employees, and besides, has a list of men who have applied for positions or who may be available for future work. Frequent complaint is heard about dishonest employees, but the wise manager protects himself against any possible losses by fraud or theft by bonding the employees who hold positions of any responsibility.

With tenants great care must be used in selecting the right people. A poor tenant who will accept any kind of a bargain, disadvantageous either as to terms or character of soil, will make as much of a failure of the plantation's business as he does of his own. Too many plantation managers think they are doing a clever piece of business when they make a sharp deal that is not to the full advantage of the tenant.

Supervising

The secret of successful supervision lies in far-sighted planning, careful checking up, and in securing the maximum of team work from the organization.

The average plantation does little or no planning ahead. If plans are made, they are usually for the current year, but ordinarily the system of procedure has been established and things run along from year to year with only such changes as are due to weather, pests, and markets and other such conditions. This hand-to-mouth method of work causes the manager to lose sight of future possible development so that he is apt not to be prepared for new conditions that may arise. A good method of working out plans seems to be to prepare: (a) An agricultural improvement program which takes up all phases of the

[1] Consulting Agricultural Engineer, New Orleans, La. Member A. S. A. E. Read by E. B. Doran at Southern Section meeting.

plantation enterprise, and maps out the improvements which it seems wise and practicable to make over a period of several years. Such a program is similar to the "projects" 'developed by our extension departments, and outlines the details of the various subprojects which it is intended to undertake. Of course these programs are subject to amendment and change as conditions change. (b) Field plans for the coming year are worked out in detail, including such things as schedules of seeds, fertilizers, feeds and equipment needed, cropping, livestock feeding, fertilizing, building, and labor. (c) In addition weekly and monthly operating schedules should be prepared. These schedules outline the work in different departments which it is expected to accomplish during the coming week or month, and may include lists of odd jobs to be done during bad weather or spare time. The purpose of these schedules is to have means of measuring progress of work. (d) Without financial estimates, the foregoing planning may very easily be impractical, because the work which has been planned may involve greater expenditure than would be warranted by the probable income. To offset any such possibility, the methods of estimating used under the head of "financing" are used.

Without thoroughly practicable plans, failure may result unless they are properly carried out and a constant check is kept on the current progress. It is hardly necessary here to go into the details of the kind of reports and records needed; however, it is necessary that the heads of all departments turn in reports that will show clearly just what their departments are doing, what progress has been made, and all costs. Daily records of weather, growth of crops, and special happenings such as attacks of pests and other data to which it might be useless to refer, should be kept either in daily reports or diary form. In the case of livestock, records of feeds used, deaths, births, purchases, production, sales, etc., must be kept. In one instance the installing of a complete daily labor cost of production report in a dairy resulted in putting it on a paying basis, and incidentally showed that the first manager who kept the report was doing some stealing.

The experienced manager understands fully the fine art of personally checking up the work. He knows how to cross-question his men so as to elicit the real information he is after, and to unearth the things that they may want to conceal. He is also familiar with the various schemes which are being carried out to defraud the plantation of time and money or its equivalent. A manager once told me that his "niggers used to lie awake nights thinking up new schemes to get out of doing work, while he used to lie awake figuring out ways to beat them." Only a person who has been intimately connected with plantation management in the South and Latin-America can appreciate the various schemes which are resorted to to get a little graft. Thus, in irrigating and hoeing by the task system, a favorite scheme is to leave the center of the field untouched. This practice is most common where the contractor is aided and abetted by the overseer himself. In such cases the man doing the work usually pays the overseer a certain percentage of the money he gets, and the overseer keeps out of the middle of the field.

Another scheme is the padded pay roll where the overseer and the contractor turn in a bill for a certain amount of work done by a certain number of hands. The money received for the hands who were not there is divided between the overseer and the contractor. Still another graft is for the contractor to make a bid for a piece of work considerably higher than it should be, and he then pays the overseer a certain sum for every piece of work done. Then in the case of livestock, it is not uncommon for mules, hogs, cattle, etc., to be reported as dead when they have actually been sold and the money pocketed by the overseer. In contract plowing covering part of the ground with a wide furrow so that the unplowed land does not show is another way of beating a plantation. It must be evident therefore that the careful selection of overseers and other responsible employees, and the sharpest kind of inspection are necessary to prevent heavy losses from grafting. The systematic use of the warehouse system and careful cost accounting are also aids in stopping leaks.

No manager can be really successful who does not have friendly and democratic relations with his employees. The day is passing for the type of manager who rides about on a horse or in his automobile dressed in the latest style, and does not even condescend to say "good morning" to the lowliest laborer on the plantation. I know of one manager whose success in securing team work from his men has been partly due to asking any one of them for a chew of tobacco when he needs it. Of course it is understood that the manager cannot be on too intimate terms with any of his employees, but it is possible to be kind and friendly, and interested in everybody without going so far that some of the employees will try to take advantage.

The real far-sighted manager pays considerable attention to the instruction of and recreation for his employees. He plans meetings at which the employees express their opinions and encourages them in making suggestions for the welfare of the plantation. He sees to it that inexperienced emeployees are properly trained and that they are given a fair chance for advancement. He also provides places of and means for recreation, and sees to it that the living conditions are sanitary and attractive. One other factor of successful supervision is in foreseeing things that are apt to happen, favorable or unfavorable. This includes anticipation of attacks of various pests, unfavorable weather conditions, insurance, and legal precautions.

A child will never learn to walk unless it is first encouraged to strengthen its legs by creeping and then pulling

(Continued on page 15)

Agricultural Engineering

The Journal of the American Society of Agricultural Engineers
PUBLISHED MONTHLY BY THE SOCIETY AT AMES, IOWA

F. N. C. KRANICH.....President
F. W. IVES.....First Vice President
J. B. Davidson.....Secretary-Treasurer
FRANK P. HANSON.....Ass't Secretary in charge of publication

Subscription, $3.00 per year. Per copy, 30 cents. Canada, 50 cents additional; foreign, $1.00 additional.

Personals

E. B. McCormick is now in charge of the motor truck division, U. S. Department of Agriculture.

S. H. McCrory, in charge of the division of drainage and irrigation office of public roads, U. S. Department of Agriculture, is also in charge of the division of rural engineering.

E. E. Whaley, of Springfield, Ohio, has been named manager of the National Tractor Show at Columbus, Ohio, next February.

C. M. Eason is now vice president of the Hyatt Roller Bearing Co. in charge of all sales. He makes his headquarters at the factory in Newark, New Jersey.

Mr. Frank A. Meckel, formerly in the Extension Service of the University of Missouri, has accepted the position of agricultural engineering editor of the *Capper Farm Press*, Topeka, Kansas.

Raymond Olney, chairman of the A. S. A. E. standards committee, called a meeting of the committee on tractor ratings at Chicago, September 3d. A standard method of tractor rating is fast taking form and will be ready for publication in the near future.

Prof. G. L. Shanks was in the office recently. Prof. Shanks will have charge of the agricultural engineering work at the Manitoba Agricultural College, Winnipeg, Canada.

Prof. J. McGregor Smith, who is in charge of the agricultural engineering work at the University of Alberta at Edmonton, Canada, was in the office recently.

Prof. L. J. Smith has left the Manitoba Agricultural College to be head of Department of Agricultural Engineering at the State College of Washington, Pullman, Washington.

Mr. Claude K. Shedd has resigned his position as engineer in charge of tractor testing with the University of Nebraska and is now tractor and implement salesman with F. R. Hussong of Lincoln, Nebraska.

Mr. R. E. Bosque, formerly of Texas A. and M. College is now head of the Agricultural Engineering Department at North Carolina State College, Raleigh, North Carolina.

Prof. J. B. Davidson, head of the Department of Agricultural Engineering at Iowa State College and present secretary-treasurer of the A. S. A. E., has been invited to deliver an address at the National Implement and Vehicle Association convention at Atlantic City, New Jersey, on October 20, 1920. The subject of his address will be "Standardization."

Mr. W. W. Smelker has resigned his position with the Cleveland Tractor Co. to accept a position in the sales department of the Roderick Lean Manufacturing Company.

Notice to Colleges and Libraries

A number of the members of the Society desire seeing the *Chilton Tractor Journal* indexed by The H. W. Wilson Company, 958-964 University Avenue, New York City. Whether this company will do this depends upon the demand from the colleges and libraries. If you are at all interested please inform them.

Conventions of Implement Dealers Associations

Ohio—November 17 and 18, 1920.
Indiana—December 1, 2 and 3, 1920.
Iowa—December 6, 7, 8 and 9, 1920.
Wisconsin—December 7, 8, 9 and 10, 1920.
Michigan—December 7, 8, 9 and 10, 1920.
Illinois—December 14, 15 and 16, 1920.
South Dakota—January 4, 5, 6 and 7, 1921.
Mid-West—January 5, 6 and 7, 1921.
Minnesota—January 11, 12 and 13, 1921.
Mississippi Valley—January 25, 26 and 27, 1921.
North Dakota—January 26, 27 and 28, 1921.
Pacific Northwest Hardware and Implement Association—January 18, 19, 20, 21, 1921.
Texas Hardware and Implement Association—January 18, 19, 20, 1921.
Western Retail Implement and Hardware Association—January 18, 19, 20, 1921.
Kentucky Hardware and Implement Dealers' Association—January 25, 26, 27, 1921.

The Eastern Farmer and the Motor Truck

"What do you find to be the greatest advantage of owning a motor truck?"

Of 753 farm owners of motor trucks who were asked this question by the United States Department of Agriculture, ninety-one per cent said "saving time."

About twenty-five per cent of these men had found better markets since buying their trucks, but fifty per cent of them had not cut down the number of their work stock by as much as a single head, while less than one man in ten had cut down his work stock more than two head.

Members are urged to notify the Assistant Secretary of any changes in address or position. A new directory is being planned.

The Hardware Association and College Agricultural Engineers

By Herbert P. Sheets[1]

The college agricultural engineer's job is to educate farmers, present and prospective, to be better farmers, to increase production, to have a larger share of the conveniences and comforts of life and to make better communities.

As the purchasing agent of the farm community the hardware merchant must study the needs of and be prepared to give his customers the merchandising service essential to more efficient farming and increased production.

The function of the Hardware Association, with its membership of 18,000 progressive merchants, seventy-five per cent of whom serve agricultural territory, is to make better hardware merchants, who will give better service to the public.

So it is at once apparent that these three factors have many interests in common, though we may go about our work from different angles and in different ways.

Because of its vast uncultivated acreage, the agricultural potentialities of the South are greater than any other section.

You engineers test and study soils to determine how and for what crops this land may best be utilized, and how maximum production may be secured.

The hardware merchant must also know something of soils, the crops best suited to his territory and the best tools and implements for the preparation of seed bed, planting. cultivating, and harvesting.

In the absence of adequate protection continuous washing is leaching the fertility from the hillsides, while lack of drainage makes waste of lower levels.

You search out and advise as to best methods of saving the hills and draining the bottoms. The hardware man is interested since such reclamation adds wealth to the community and enlarges his business opportunities.

You engineers are doing much to make diversified farming standard practice instead of a mere subject of discussion.

The hardware merchant assists because he knows everybody will profit.

The migration of the negroes to the high wage centers has handicapped southern agriculture with a shortage of farm labor.

The agricultural engineer tests, studies, and demonstrates farm machinery to determine its adaptability to the various soils and crops and educates farmers in the importance of using such time and labor saving equipment.

The task is not always easy, since too many farmers are content with the old ways, preferring the Georgia stock to the modern riding plow which will do better and three or four times as much work, with less labor.

But the hardware and implement merchant has already done much to extend the use of modern farm equipment, many selling improved types of implements and labor-saving devices for the home on a trial and approval basis, to be returned without cost if the farmer is not thoroughly satisfied.

As the farmer becomes educated in better farming methods and the use of time and labor-saving equipment he recognizes the need of better housing and is better able to finance the construction and furnishing of a modern home.

Out of your experience and study you recommend building plans designed to banish housekeeping drudgery and give conveniences and comforts never dreamed of in former days.

You also urge the construction of modern barns, granaries and other structures for the better protection of live stock, farm implements, and farm products.

To the hardware man modern buildings mean not only the sale of nails, builders hardware and kindred lines, but a better community in which to live and do business. He knows that the building of better farm houses, barns, granaries, live stock, and implement sheds and other structures is both an evidence and a measure of progress.

Year after year sanitation assumes increased importance; a vital factor of modern life to which the farmer has given too little attention.

As his advisers, you engineers must sell him the sanitation idea and furnish plans for the needed improvements.

The hardware merchant realizes that keeping the people on the farms and building up our small towns is vital to the national welfare, and that in selling city conveniences to the farmer he is profiting his community as well as himself.

Good roads are of prime importance to every community, not alone because of the growing use of the automobile, but because of the great need of quick and economiacl transportation for the marketing of farm crops. Here again is work for the agricultural engineer, in which hardware merchants gladly join.

But by far your most important work is in the train-

[1] Secretary-Treasurer National Retail Hardware Association. Paper read at Southern Section meeting.

ing of the young men and boys who will be the farmers of tomorrow. Coming under your influence with open minds, you have a wonderful opportunity to lay the foundation for greatly needed reforms in farming methods.

The hardware man knows that the farmer boys of today will be the farm equipment buyers to tomorrow, and that their specialized training now means higher standards of agricultural efficiency in the future.

Is it not reasonable to suppose, then, with such unity of interests and purposes, that engineers and merchants may well coöperate in their efforts to promote better agriculture and community progress?

Certainly there has been too little teamwork in the past, possibly because we have known too little about each other's work.

You men have been so immersed in your own affairs that you have not thought to tell either merchants or their association officials what you are doing; and the activities of some county agents and other farm advisers have given the impression that the promotion of mail order and collective buying is your principal business.

On the other hand, we have been following our own programs, without getting in touch with you or telling you about our efforts to educate merchants for more efficient merchandising service to the public, and particularly to the farmer.

So it seems to me the time has come for a better understanding of motives and work and a greater coöperation in the promotion of common aims. The field is big and the opportunities unlimited.

Effective work in this direction has already been done in Mississippi, where A. and M. College got the coöperation of the merchants in a washing machine campaign, which resulted in the purchase of one thousand power washers where there had been practically none before.

Later a farm fence campaign was planned in connection with local dealers and manufacturers and doubtless would have been equally successful but for the fact that the fence itself was not available.

It was in the Junior Farm Mechanics Course, last fall, that the interest and help of the hardware men was most in evidence, however, with the result that the attendance was several times as large as the extreme number the college expected.

Of course the situation in Mississippi is ideal for the most complete coöperation of this character, since the college's agricultural engineer is also secretary of the hardware and implement association.

But there is no reason why equally good work may not be done in other states, if you engineers will get in closer touch with merchants and convince them of your sincerity in seeking their coöperation and your willingness to cooperate with them.

This can best be done by working through the hardware association as well as directly with the dealers. If you will tell the secretaries of state and national organizations about your plans and how we can help you with them, you will find us not only willing but anxious to work with you.

Economics teaches that human wants can only be satisfied through the production, exchange and transfer of goods among men, and the distribution of the collective income among those who coöperate in the creation of that income.

Agriculture, industry, and commerce are so interwoven, so interdependent, in these modern days, that progress can be made only through efficient division of labor, economic understanding, and teamwork.

When you engineers make a better farmer you make a better community.

When the Association makes a better merchant it also betters the community.

When the farmer increases his production he brings more wealth into the community.

When the merchant gives the farmer the service essential to greater production he also increases community wealth.

This means progress and prosperity — for the community, for the state, for the nation — as well as for the individual.

The very nature of his business brings the hardware merchant into clearer contact with and gives him a more intimate understanding of the farmer's problems and needs than any other community factor.

Not only is he called upon to supply the great variety of merchandise needed for the farm; his counsel and advice are sought on a multitude of agricultural problems.

His prestige is enhanced by the fact that the mortality of the retail hardware trade is less than half that of most retail lines. He stays in business longer, knows his customers better, and they know him better.

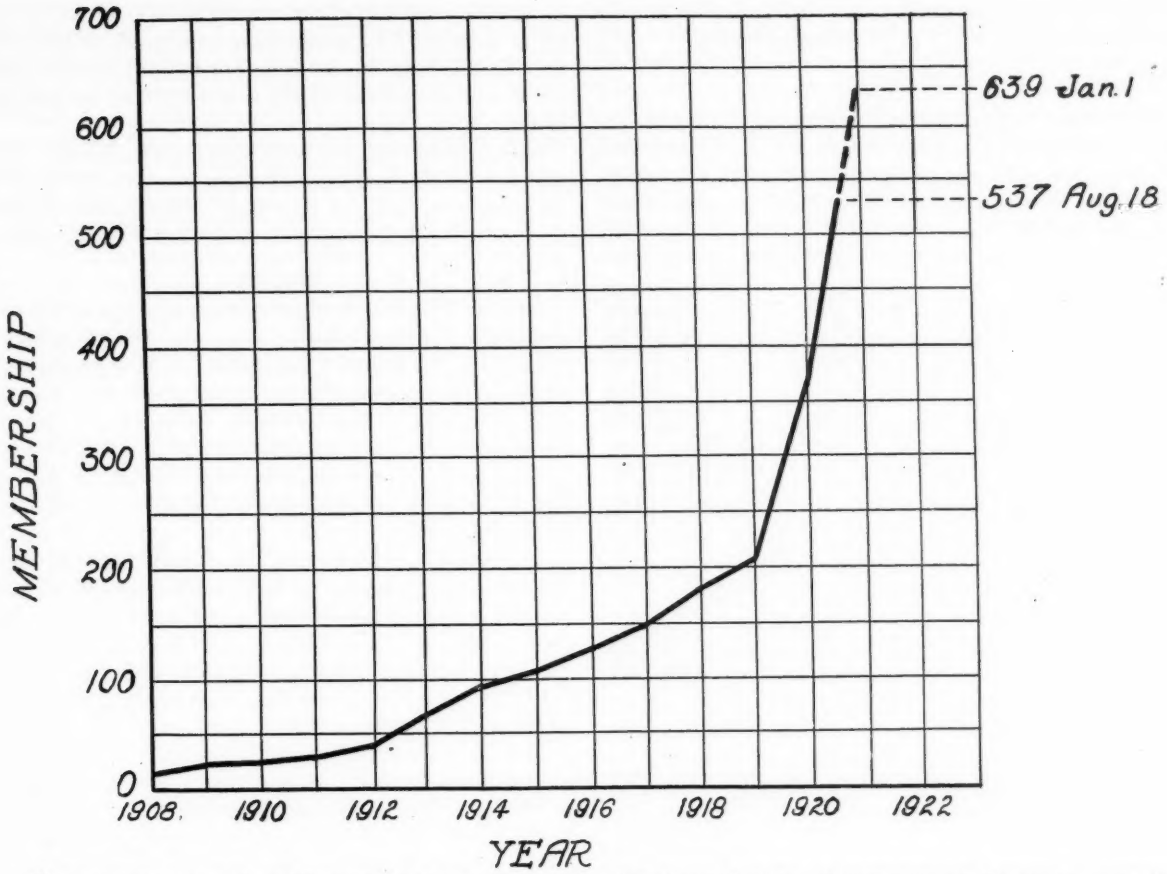
All authorities recognize the personnel of the retail hardware business as measuring higher in business ability and financial stability than any other branch of the retail business.

All of which should encourage you engineers to utilize the assistance these men can give in planning and carrying out aggressive educational campaigns to stimulate the farmer's interest in the many measures you undertake to better Southern agriculture and increase farm production and wealth.

We do not claim that every dealer is sufficiently progressive to have the broadest vision of his service function. Many are content with the beaten paths of storekeeping, just as many farmers are satisfied with the antique methods of their inheritance.

But the hardware association is bending all its efforts to educate these dealers to a better understanding of their true function, just as you engineers are educating farmers for greater efficiency in their work.

And we know that while the merchant's business will benefit from better farming, better housing and the in-



The accompanying chart illustrating the growth of the American Society of Agricultural Engineers explains why it is possible to publish AGRICULTURAL ENGINEERING. The membership at this time, August 18, is 537. For the first eleven years the membership did not increase very fast due to a lack of attention, for no special effort was made to increase the membership. It has been demonstrated that the field is large, however, and the promise for a rapid increase is very good since it is receiving more attention.

For the current year there has been an increase, to date, in membership of over 49 per cent. The increase for last year was almost 60 per cent but it promises to be more this year. If the increase continues the same the remainder of this year it will be almost 77 per cent. However the goal is not 639 as might be concluded by the chart.

creased community wealth resulting from improved conditions, he can hope to prosper only as he renders efficient and economical service to his customers and his community.

We know, as you know, that this is the day of coöperation; that there is no longer room for class jealousies, misunderstandings, aloofness, suspicions; that service, not selfishness, is today's measure of progress.

We realize that sincere service always has its reward; that he profits most who serves best.

Gladly will we serve with you.

Plantation Management from the Inside

(Continued from page 11)

itself up. So the plantation overseer or other responsible employee will not develop his initiative, interest and ability unless the manager gives him a fair chance. How often do I hear managers complaining of the inefficiency or lack of interest of this or that employee when I know that the manager so dominates him and issues minute detailed orders that the poor man, afraid for his job, frequently carries out instructions which his practical experience and common sense tell him are a serious mistake. The only way to develop responsibility and ability in an employee (provided you have the material to start with) is to give him the opportunity to show what he can do and help by friendly suggestions instead of "cussing him out" when he makes a mistake. Too many plantation managers seem to be looking more for a chance to criticize than to commend and encourage their assistants. Conversely, it is almost as great an error to unduly praise, as this is apt to create "swelled heads." The well-balanced manager with poise and good judgment praises,

suggests, criticizes or scolds as may be necessary, but the men always know that he is their square friend.

Financing

A definition of this subject might be: "How to get money, and when and how to spend it." Sometimes it is "up to" the manager to secure money to finance his operations, but more usually that is a function of the president and board of directors. However, a well-managed property with a progressive but safely conservative business policy which is being maintained in good physical condition with a healthy balance sheet generally finds little difficulty in obtaining necessary loans. So, in the last analysis, the manager is the most important factor in financing.

Perhaps the biggest problem is how to be progressive without spending money unwisely. I know of an instance where the manager of a large farming enterprise was a man of great experience—a fine livestock man and a first-class farmer. Yet he did not know how to spend money wisely, and his expenditures unduly increased his investment and exceeded his income. However, an annual budget estimate opened his eyes.

The remedy for extravagance is: (a) Systematic planning ahead of the plantation's operations, (b) a conservatively prepared annual budget, (c) not permitting the expenditure of any large sums of money until an estimate with full data has been approved. This financial policy is a safeguard to the interests of the manager as well as of the plantation.

Almost as bad as spending too much money is spending too little. It has become a custom with many planters, especially in the South, to base their expenditures for the year on the current crop prospects. This has probably been caused largely by the practice of the bankers who have based their loans to planters on a single crop like cotton or sugar cane, instead of demanding the security of a well-balanced farming system and forcing the planters to farm on a *permanent* instead of a year-to-year, single-crop, gambling basis. However, even with one major money crop there is no reason why plantation owners should not make their farming operations follow long-time plans for constant improvement, including the increasing of production and efficiency. As it is, the year-to-year "planter" (he is not a real farmer at all) says "The crop prospects are very bad this year; therefore, I shall not spend any money for fertilizers." Yet even at fairly low prices for cotton or cane, the expenditure of one dollar for fertilizer would probably bring him in two.

The test for whether or not to spend money is to "do a little figgerin." Suppose weevil-proofing a 10,000-bushel corn crib will cost $2,000, is the expense justifiable? The annual loss from weevils (not counting rats) is about 10 per cent, or 1,000 bushels of corn, worth say $1.25 per bu., or $1,250. The cost of fumigating the corn would be about $250, while the interest and depreciation on $2,000 at say 15 per cent would be $300, or a total expense of $550. This would leave a net profit of $700, not only for one year, but for many; or to put it another way, the investment on the $2,000 would yield 45 per cent interest.

Other things which a good manager usually does is to discount his bills and settle all loans and other obligations promptly when due. A plantation with the kind of business policy I have outlined rarely has trouble getting credit.

Buying

Saving money in buying is making profits. Careful plantation buying annually causes the loss of millions. We helped one company save $40,000 on the purchase of fertilizers alone, and all our clients saved this year in buying fertilizers over $100,000. However, the loss is not always direct in money only, but often comes through buying goods of poor quality which later cause loss of time and money by breakdowns (of farm machinery), heavy depreciation, etc.

Experienced farm managers buy on specifications only, and then after securing quotations from several reliable concerns. The standardizing of equipment and other commodities helps materially to reduce the cost of buying and to insure quality. Inexperienced manageres would do well to buy standard, high-grade goods from thoroughly reputable concerns.

Other losses may be avoided by carefully checking up all purchases as received, preferably through a warehouse. Incidentally, checking all materials and supplies in and out of the warehouse prevents petty thieving and graft. In the case of corn, hay, fruit and other farm products, the measuring or weighing and checking of them as they are harvested and later when they are fed or sold will stop serious leaks. Money may also be saved by familiarity with traffic routes, rates and regulations.

Technical Methods

Experience has done more harm than good to some plantation managers. They get the idea that their long years in the business qualifies them to speak and act as past masters of the game, and they became immune to new methods and intolerant of suggestions from their employees or any one else. Yet the really wise manager realizes that technical field methods, based on our constantly increasing agricultural knowledge, must change and progress, and that he must always be on the lookout with an open mind to grasp new practical ideas from whatever source. Agricultural literature, college courses, experiment stations, county agents and consulting agriculturists all have something of value for the plantation manager if he will but take it. Modern commercial farming has no place for the know-it-all manager.

The subject of technical methods is so familiar to you all that I will not dwell on it here. A certain amount of practical testing and experimenting must always be done on a small scale, and many thousands of dollars could

have been saved, had the management been governed by "test instead of guess." The standardizing of methods, livestock, machinery, buildings, etc., must be one of the important developments. Inefficient men, work stock and livestock in general can best be weeded out by careful (but simple) performance records. And costs should cover every more that is made to improve technical methods in office and field.

Too close attention cannot be paid to the practical application of technical methods. Thus matching the feeding of 300 mules has resulted in a saving of $15.00 per day. The use of a new cover catch crop has increased the cane yield $12.00 per acre. Changing a fertilizer formula made a better balanced fertilizer and saved a company $40,000 per year. It pays to watch the technical details.

Selling

First, a product must be raised that will sell. It must have the quality and must be what the market requires. Then if the planter has something to sell, he must not "hide his light under a bushel." Advertising is apt to be needed, and it is unnecessary to add that the product should be "as advertised." Perhaps the most common fault of managers of large plantations is thinking that their size does not make coöperation with other planters necessary. All farmers hate to work together until they have to. Nevertheless, the only way the big planter can insure his securing a fair price for his products (and a square deal from the politicians) is to coöperate with his fellows in a strong selling organization.

Hardening Soft Center Steel Plow Shapes

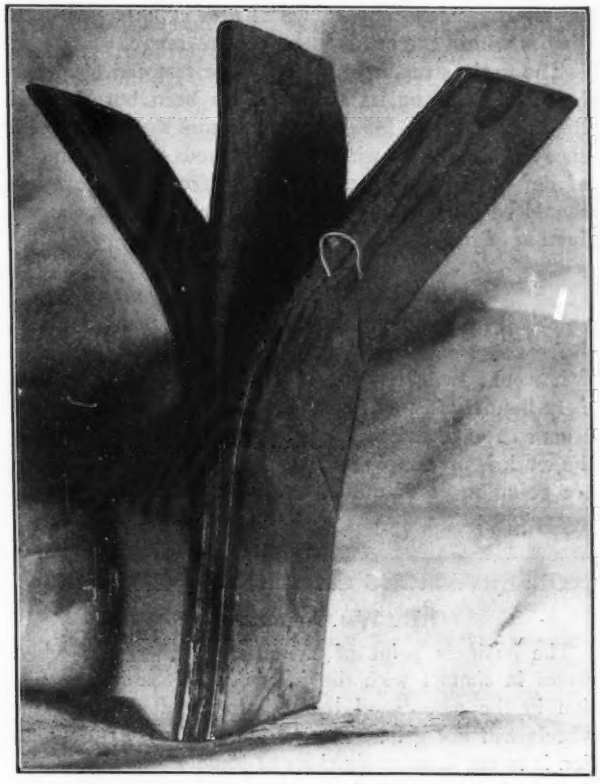
(Continued from page 9)

The furnace is generally of the revolving type or automatic conveyor feed, which gives a uniform heat and is convenient for the operator to charge. When oil is used as fuel, the burner should be located on the side and baffle walls constructed so the flame will not impinge directly on the shapes; these tangential walls prevent foreign particles collecting on the steel and will also give a radiated heat to the heating chamber.

The oil burners should be of a type requiring very little regulating, rather keeping a steady uniform flame, so essential for thermal treatment of steel. The temperature of the heating chamber can be taken with an electric recording or portable pyrometer, care being taken that the heating tip is located clear of the flame and away from drafts.

The quenching tank should have at least a capacity of five hundred gallons of brine, with provision for continuous circulation. As the rate of cooling is proportional to the temperature of a quenching medium it is important that an ammonia refrigerating unit be installed to maintain a constant temperature of between 25°-30° Fahr. A recording temperature is advantageous for keeping a close record of the temperature at all times. The brine solution having a density between 90 and 95 (salometer reading) can be of any salts giving satisfactory results, preferably calcium chloride.

After the shape is heated to a dull cherry red approximately 1450° Fahr., it is removed and the cutting edge annealed by dipping in wet sand. It is then quickly immersed point first into the quenching tank. The shapes are immersed perpendicular to their greatest axis of symmetry, which causes the thickest portion of the shape to



Photograph Showing the Three Layers of Soft Center Steel

be immersed first. After a sufficient time has elapsed for the steel to thoroughly cool it is removed, the hardening process being completed. The shapes are now classed as "hard shapes" to distinguish from the crucible and open hearth, but their hardness number is an optional figure at the present time.

Using the present apparatus for measuring hardness, the schleroscope, Brinell machine, and schlerometer, the results are at variance, making it difficult for research work on the friction of various soils on plow bottoms. It would be well if the standardization committee of the A. S. A. E. would give this hardness subject their attention and formulate some definite procedure for determining the hardness of plow shapes.

In conclusion it can be stated that there are many fac-

tors entering into the manufacturing operations which sometimes have a detrimental effect on the hardened shapes. When a hardened shape is easily broken and shows a very coarse grain structure it should not be attributed to defective steel. This can be traced to a manufacturing operation where the operator finished his "hot working" at a temperature considerably above the critical point and grain growth has taken place as shown in the photomicrographs. "Cold working" which is done below the critical temperature does not improve the steel as often thought; it causes distortion of the steel and brittleness. Hence, the importance of also manufacturing the shapes within the critical temperature range.

The grain structure can always be restored by proper heat treatment unless the steel has been burnt. Heat treatment, heat to 1450° Fahr. and cool slowly. Experience has shown that with proper methods used the amount of defective plow shapes accruing from all operations should be considerably less than 1%, thus giving a production of uniformly hardened shapes.

Standardization of Farm Equipment

(Continued from page 5)

the rating of manure spreaders and grain threshers.

It would seem that standardization in the farm-equipment industry is well under way, and while a rapid pace cannot be expected in the matter of adopting standards, the work is progressing slowly but surely and the results are going to be of untold benefit not only to manufacturers but to purchasers of farm equipment as well.

OBSERVATIONS ON WHEEL EQUIPMENT

By Wm. Aitkenhead [1]

The business point of a tractor is where the wheel comes in contact with the ground. Mechanical perfection in the motor and transmission avails little if the wheels will not grip. The obvious and the crude solution is to put large projections of some sort on the wheel to make it hold. This is the usual practice. Half of the tractors shown in an August tractor journal have angle iron cleats. Spade lugs are a close second. A few have cones and some have long penetrating lugs to hold in loose dry soil. Consider the great range of conditions under which a tractor may be required to work, and then the difficulty of producing a satisfactory universal cleat will be plain. Conditions varying from stiff clay to loose sand, or from a gravel road to peaty muck may all come within the range of one machine, not to mention the degrees of wetness or dryness which add numerous phases to the conditions under which a tractor must obtain its propulsive effect. Some wheel tractors have as regular equipment angles which project past the outside of the rim. In the spring when the soil is plastic and sticks to the rim, giving in effect a smooth wheel the projecting cleats give traction, but on dry, loose soil with clean wheels these outreaching angles are traction destroyers, since they slice up a wide strip of ground. A tractor so equipped will be found barely able to move itself in loose, sandy ground. Long penetrating lugs may be the remedy, but it takes fuel to roll a wheel so spiked, and prompt removal is necessary for movement over a hard road. The conclusion can not be avoided that the propulsive part of a wheeled tractor still needs the careful thought of the designer. With favorable soil conditions it may seem unimportant, but a streak of sand or a wet spot in a field will make tractor tillage a vexatious proposition. A viewpoint of the track layer type is that the construction ignores soil conditions by substituting a steel track for them. Already several wheel types, involving the same principle have been devised, in fact the search for the wheel of universal utility will lead to a type which successfully "lays a plank and rolls on it."

[1] Associate Professor, Division of Farm Mechanics, Purdue University. Member A. S. A. E.

The recent organization of an Agricultural Engineering Company at Columbus, Ohio, announces F. W. Ives, president; H. P. Miller, vice president; J. A. Howenstine, secretary, and W. P. Miller, treasurer and general manager. The company has been organized to give professional service on agricultural engineering and farm problems.

Transactions

The 1919 Transactions are rapidly nearing completion and should be ready for distribution October 5.

More Information

In the October Journal we hope to have more information concerning the A. S. A. E. convention in Chicago. The committee on local arrangements expects to know by that time at what hotel the convention will make its headquarters.

Southern Section Increasing Membership

The Southern Section of the A. S. A. E. is working to increase their membership. They have plenty of good men in the south who should belong to this society so that with the strength of a larger organization of interested men they can better meet their problems that are in the field of agricultural engineering. Soil erosion and sanitation are two big problems calling for attention.

Papers of Southern Section Meeting

The October issue of this Journal will have several more articles which were presented at the Southern Section Meeting at Memphis.

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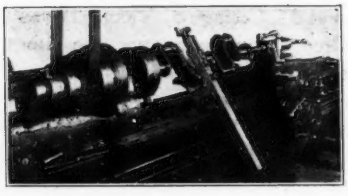

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